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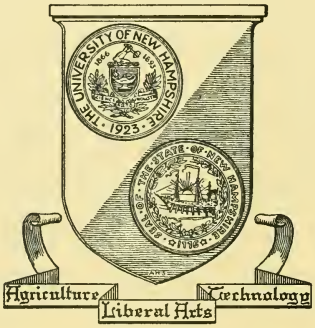

The University
of
New Hampshire

Bulletin 397 September, 1952

THE UNIVERSITY OF NEW HAMPSHIRE
AGRICULTURAL EXPERIMENT STATION

Department of Agricultural and Biological Chemistry

Inspection of Commercial Fertilizers

Made for the

STATE DEPARTMENT OF AGRICULTURE

H. A. DAVIS and E. E. EASTMAN

THE UNIVERSITY OF NEW HAMPSHIRE
DURHAM, N. H.

INSPECTION OF COMMERCIAL FERTILIZERS

Made for the

State Department of Agriculture

The inspection of commercial fertilizers reported in this bulletin was made under the direction of the Honorable Perley I. Fitts, Commissioner of Agriculture. Mr. George H. Laramie, Fertilizer Control Supervisor, and Mr. Harold W. Ayer, Inspector, collected samples of 113 brands of mixed fertilizer and fertilizer materials which were offered for sale by dealers or had been delivered to consumers during the year ending June, 1952. The general character of the brands sampled is shown by the following classification:

Complete fertilizer	62
Phosphoric acid and potash	15
Superphosphate	11
Nitrate of Soda	2
Ammonium nitrate	4
Muriate of potash	3
Ground bone	4
Natural manures	9
Tankage	1
Urea	1
Milorganite	1

THE FERTILIZER LAW

The chief purpose of the official inspection required by the fertilizer law is to protect the consumer against the misbranded products which doubtless would soon appear on the market if the sale of the fertilizer was not under state regulation. The purchaser of fertilizer or fertilizer materials should acquaint himself with the full text of the law. He should not accept from the dealer any bag of fertilizer which is not tagged and guaranteed in compliance with the law. If he does so, it is at his own risk.

The law governing the guarantees and labeling of commercial fertilizers or fertilizer materials follows:

"Every lot or parcel of commercial fertilizer or fertilizer material sold or offered or exposed for sale within this state shall be accompanied by a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in the package; the name, brand or trademark under which the fertilizer is sold; the name and address of the manufacturer or importer; the location of the factory; and a chemical analysis stating the minimum percentage of nitrogen, of available phosphoric acid and of water-soluble potash expressed in whole numbers.

"No fertilizer or fertilizer material containing the three essential fertilizing elements, nitrogen, phosphoric acid and potash may be sold or offered for sale if the total minimum plant food nutrients contained therein is less than fourteen per cent by weight, provided however that natural animal and bird manures shall be excepted from the provisions of this section."

Copies of the full text of the law may be obtained from the Fertilizer Control Supervisor, State House, Concord, N. H. Inquiries concerning the law and all matters relative to the registration of brands should be addressed to his office.

The value of a fertilizer depends mainly upon its content of available plant food, particularly nitrogen, phosphoric acid and potash. Research workers in

Agricultural experiment stations and industrial research groups are constantly studying the needs of the soil to improve crop yields. As a result of these studies, other plant nutrients are included in certain fertilizers for specific crops. Magnesium and boron are examples of so-called minor elements furnished by some brands of fertilizer to correct specific deficiencies of the soil in certain localities.

All control officials charged with the enforcement of state laws regulating the sale of commercial fertilizers and fertilizer materials, are joined in the Association of American Fertilizer Control Officials. Research workers employed by State or Federal Agencies engaged in the investigation of fertilizers are also members of this Association. The object of this organization is to "promote uniform and effective legislation, definitions, rulings and enforcement of laws relating to the control of sale and distribution of mixed fertilizers and fertilizer materials in the Continent of North America." Annual meetings of this Association are held at which reports and recommendations of investigators concerning definitions of fertilizer materials, use of new products, and problems concerning regulation of the fertilizer trade are discussed in detail. Fertilizer manufacturers are invited to participate in these discussions and through mutual cooperation the farmer is supplied with a product that can be relied upon to do the job expected in crop production. The Official Publication of the Association may be obtained for a small fee through the office of its secretary, B. D. Cloaninger, Clemson, South Carolina. This booklet contains the official terms describing fertilizer materials, a proposed model state fertilizer law as well as the proceedings of the annual meeting.

Whether or not a fertilizer contains the guaranteed amount of plant food can be determined only by a chemical analysis. For this reason it is considered necessary that each brand of fertilizer offered for sale be officially sampled and analyzed each year. When failure to meet the guarantee is proved by chemical analysis, the prosecution or seizure provisions of the law may be invoked. The purchaser's refusal to buy a fertilizer which does not conform to the law will not only assist in the enforcement of the law but will at the same time insure him the protection of the law.

USE OF COMMERCIAL FERTILIZERS

It is not within the scope of this bulletin to make recommendations regarding the use of commercial fertilizers. The Department of Agronomy and the Department of Agricultural and Biological Chemistry of the University of New Hampshire Agricultural Experiment Station test soils and conduct experimental work with various fertilizer materials on hay and crop land. The Department of Horticulture investigates fertilizer treatments for fruits and vegetables. Much of this work has been published, and is available for free distribution to residents of New Hampshire. Address your request to Mail Service, University of New Hampshire, Durham, New Hampshire.

Sta. Cir.	58	Fertilizer Needs of Alfalfa on New Hampshire Soils. 12 pp.
Sta. Cir.	59	Effect of Soil Moisture and Fertilizer Placement on Vitality of the Potato Seed Piece. 11 pp.
Sta. Cir.	61	Fertility Needs of Dairy Farm Crops in the Connecticut Valley. 12 pp.
Sta. Cir.	63	Fertilizers for Sweet Corn. 8 pp.
Sta. Cir.	74	The Response of Clover and Total Forage to Top-Dressing Fertilizers. 12 pp.
Sta. Bull.	324	Experiment with Potatoes. 38 pp.
Sta. Bull.	362	Purchasing Fertilizers in New Hampshire. 31 pp.
Ext. Cir.	210	Purchasing Lime and Fertilizer. 12 pp.
Ext. Cir.	212	Cabbage. 4 pp.

Ext. Cir.	266	Root Crops. 20 pp.
Ext. Cir.	275	Culture of Low-Bush Blueberries. 16 pp.
Ext. Cir.	299	Tomatoes for New Hampshire. 20 pp.
Ext. Bull.	100	Growing Apples in New Hampshire. 32 pp.
Ext. Bull.	104	Growing Vegetables at Home. 32 pp.
Ext. Bull.	105	Asparagus in New Hampshire. 16 pp.

While the word fertilizer does not appear in all of the above titles, no publication is included which does not discuss the use of fertilizer.

SUGGESTED RATIOS AND GRADES

The information concerning suggested ratios and grades was supplied by the Department of Agronomy and is presented here with their permission.

Because of reduced supplies of superphosphate for the 1951-52 season, the Agronomists of New England at a recent meeting suggested the following ratios and grades for the next year:

Ratios	Minimum Grades	Other Probable Grades
0-1-2	0-10-20	0-12-24 0-15-30
1-1-1	8-8-8	10-10-10
2-3-4	6-9-12	5-8-10
3-4-4	6-8-8	8-10-10
2-1-2	6-3-6 } Tobacco Grades	
1-1-3	5-5-15 }	

These recommendations represent a reduction in the number of ratios and grades now in vogue. However, it is recognized that many manufacturers have already made up some grades of fertilizer which have previously been offered and that these, such as the 0-1-1 ratio in the 0-14-14 or 0-20-20 grades may still be offered.

It was the belief of the agronomists that the 0-1-1 ratio should still be offered, particularly for seeding down, but that for later top-dressings in that field that an 0-1-2 would be satisfactory as long as legumes predominated in the stand.

It is believed, also, that on soils with long continued applications of fertilizer of a 1-2-2 ratio, that potato and vegetable growers could go to a 2-3-4 or a 3-4-4 ratio without reducing crop yields. All the experimental evidence points to heavy accumulations of phosphorus and potash under these conditions.

CONFORMITY TO GUARANTEE

The chemical analyses reported in this bulletin were made by the methods adopted by the Association of Official Agricultural Chemists.

Number of brands analyzed	113
Equalling or exceeding all guarantees	65
Deficient in nitrogen only	23
Deficient in available phosphoric acid only	10
Deficient in potash only	6
Deficient in nitrogen and phosphoric acid	3
Deficient in nitrogen and potash	5
Deficient in phosphoric acid and potash	0
Deficient in nitrogen, phosphoric acid, and potash	1

Fourteen brands were guaranteed to contain magnesium oxide. None failed to meet the guarantee. In general, the overrun in plant food guarantees exceeds the deficiencies when all brands of a manufacturer are included.

Fertilizers are largely mixtures of highly purified chemicals. Segregation of these materials in the bag may be expected. To obtain a truly representative sample of a fertilizer mixture requires careful work. The chemist can accurately determine the nitrogen, phosphoric acid, and potash content of the sample sent to the laboratory. If this sample does not correctly represent the larger lot, the analytical work is of no use. The obligation of the fertilizer control program is to see that the manufacturer is supplying the guaranteed amount of plant food to the consumer. For this reason the sample must be drawn and analyzed very carefully so that injustice will not be done to either the consumer or manufacturer.

In the tabulation of the analyses in the following pages, deficiencies of one-half of one per cent or more are shown in red ink. The names of the manufacturers are arranged alphabetically. The brand names are listed alphabetically, or numerically by formula, under the manufacturer.

	Sample Drawn In	Nitrogen		Phosphoric Acid				Potash		Magnesium Oxide	
				Total		Available					
		Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found
Allied Chemical & Dye Corp. New York, New York											
Arcadian the American Nitrate of Soda 16% Nitrogen	Exeter	16.00	16.17								
A. N. L. 20.5%	Concord	20.50	20.56								
A. N. L. 20.5% Nitrogen	Colebrook	20.50	20.94								
American Agricultural Chemical Co. Carteret, New Jersey											
Agrinite 8.25%	Nashua	8.25	8.13								
Agrico for New England 5-8-7	Colebrook	5.00	4.82			8.00	8.27	7.00	6.88		
Agrico 5-10-10-2	Lebanon	5.00	4.84			10.00	10.71	10.00	9.80	2.00	2.01
Agrico Country Club Fertilizer 6-10-4	Nashua	6.00	5.40			10.00	10.63	4.00	4.80		
Agrico for Top Dressing 7-7-7	Lebanon	7.00	5.50			7.00	8.26	7.00	7.01		
Agrico Phosphate & Potash 0-10-20	Colebrook					10.00	10.42	20.00	19.52		
American Cyanamid Co. New York, New York											
Aeroprills Fertilizer Grade Ammonium Nitrate	Brentwood	33.50	33.51								
Aeroprills Ammonium Nitrate Fertilizer	Manchester	33.50	33.97								
Apothecaries Hall Co. Waterbury, Conn.											
Bone Meal	Manchester	4.00	4.88	14.00	15.80						
Liberty Brand Fertilizer Muriate of Potash	Colebrook							60.00	61.44		

	Sample Drawn In	Nitrogen		Phosphoric Acid				Potash		Magnesium Oxide	
				Total		Available					
		Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found
Liberty Brand Fertilizer 3-12-12	Colebrook	3.00	3.15	.....	.....	12.00	12.41	12.00	12.80	.....	.....
Liberty Brand Fertilizer 4-12-4	Manchester	4.00	4.04	.....	.....	12.00	12.09	4.00	4.32	.....	.....
Liberty Brand Fertilizer High Grade 5-8-7	Ashland	5.00	5.09	.....	.....	8.00	8.72	7.00	7.52	.....	.....
Liberty Brand Fertilizer 5-10-5	Plymouth	5.00	5.34	.....	.....	10.00	10.14	5.00	5.44	.....	.....
Liberty Brand Fertilizer 5-10-10	Plymouth	5.00	5.19	.....	.....	10.00	10.92	10.00	10.40	.....	.....
Liberty Brand Fertilizer 5-10-10-1.2	Ashland	5.00	5.06	.....	.....	10.00	10.71	10.00	10.64	1.20	3.23
Liberty Brand Green Gro Fertilizer 6-7-4	Manchester	6.00	5.51	.....	.....	7.00	8.77	4.00	5.68	.....	.....
Liberty Brand Special for Fruit and Grass 7-7-7	Plymouth	7.00	7.01	.....	.....	7.00	7.67	7.00	7.84	.....	.....
Liberty Landscape & Golf Course Fertilizer 8-6-2	Manchester	8.00	9.18	.....	.....	6.00	6.26	2.00	3.28	.....	.....
Liberty Brand Fertilizer 0-14-14	Manchester	.....	.....	.....	.....	14.00	14.99	14.00	15.12	.....	.....
Superphosphate 20%	Colebrook	.....	.....	.....	.....	20.00	20.94	.....	.....	.....	.....
Armour Fertilizer Works Carteret, New Jersey											
Armour's Bone Meal Fertilizer	Keene	2.00	2.54	23.00	24.55	.....	.....	.....	.....	.....	.....
Armour Big Crop Fertilizer 5-8-7	Dover	5.00	4.71	.....	.....	8.00	8.73	7.00	7.44	.....	.....
Armour Big Crop Fertilizer 5-10-10	Dover	5.00	4.82	.....	.....	10.00	10.40	10.00	9.72	.....	.....
Armour's Vertagreen Plant Food for Commercial Crop 6-12-12	Dover	6.00	6.05	.....	.....	12.00	12.04	12.00	12.48	.....	.....
Armour Big Crop Fertilizer 7-7-7	Dover	7.00	6.74	.....	.....	7.00	8.33	7.00	7.28	.....	.....
Armour's Big Crop Fertilizer Granular 20% Superphosphate	Dover	.....	.....	.....	.....	20.00	20.84	.....	.....	.....	.....
Armour's Sheep Manure	Keene	1.50	1.43	1.00	1.09	.....	.....	2.00	4.10	.....	.....
Armour Vertagreen Plant Food	Dover	5.00	5.05	.....	.....	10.00	10.23	5.00	5.28	.....	.....

Joseph Breck & Sons Boston, Mass.											
Breck's Quick Life	Milford	14.00	14.25			30.00	31.10	16.00	18.40		
Carbola Chemical Co., Inc. Natural Bridge, N. Y.											
CCC Triple 20 Plant Food 20-20-20	Keene	20.00	20.89			20.00	23.28	20.00	19.72		
Chilean Nitrate Sales Corp. New York, New York											
Chilean Nitrate of Soda 16%	Manchester	16.00	16.06								
Consolidated Rendering Co. Boston, Mass.											
Corenco Ground Bone	Manchester	1.50	1.37	27.00	29.75						
Corenco Ground Steam Bone	Nashua	1.50	1.56	27.00	28.10						
Corenco Spurz-On	Nashua	3.50	5.20	3.50	2.29			1.50	2.40		
Corenco Brand Sheep Manure 2-1-2	Plymouth	2.00	1.69	1.00	1.45			2.00	2.40		
Corenco 5-8-7	Concord	5.00	5.02			8.00	8.39	7.00	7.68		
Corenco 5-8-7	Concord	5.00	5.03			8.00	8.20	7.00	7.52		
Corenco Home Garden Fertilizer 5-10-5	Lebanon	5.00	4.57			10.00	9.65	5.00	5.52		
Corenco 5-10-10	Manchester	5.00	5.02			10.00	10.14	10.00	10.40		
Corenco Peerless Potato 5-10-10	Manchester	5.00	5.06			10.00	10.01	10.00	10.56		
Corenco 7-7-7	Laconia	7.00	7.04			7.00	7.70	7.00	7.56		
Corenco 8-16-16	Plymouth	8.00	8.07			16.00	16.01	16.00	15.48		
Corenco 0-10-20 Hay & Pasture Special	Concord					10.00	10.33	20.00	20.24		
Corenco 0-14-14	Laconia					14.00	14.01	14.00	14.40		
Corenco Top Dressing 0-14-14	Benton					14.00	14.21	14.00	14.88		
Corenco 0-20-20	Concord					20.00	20.73	20.00	21.01		
Corenco Superphosphate	Concord					20.00	20.56				
Corenco Superphosphate 20%	Laconia					20.00	21.28				
E. J. Cote Tyngsboro, Mass.											
Meadow Brand Sheep Manure	Nashua	1.50	1.45	0.50	0.35			3.00	1.84		

	Sample Drawn In	Nitrogen		Phosphoric Acid				Potash		Magnesium Oxide	
				Total		Available					
		Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found
E. I. DuPont de Nemours Co. Wilmington, Delaware											
NuGreen Fertilizer Compound	Concord	44.00	44.22								
Eastern States Farmers Exchange, Inc. W. Springfield, Mass.											
Eastern States 5-10-10	Concord	5.00	5.01			10.00	10.49	10.00	11.04		
Eastern States 5-15-15	Woodsville	5.00	5.08			15.00	15.41	15.00	15.20		
Eastern States 8-12-12	Woodsville	8.00	8.06			12.00	12.60	12.00	12.56		
Eastern States 8-16-16-1	Concord	8.00	7.82			16.00	16.58	16.00	16.80	1.00	2.04
Eastern States Fertilizer 8-16-16-1	Concord	8.00	7.63			16.00	16.84	16.00	16.96	1.00	1.90
Eastern States 10-10-10	Concord	10.00	10.01			10.00	9.85	10.00	11.28		
Eastern States Plant Starter 10-52-17	Dover	10.00	10.10			52.00	53.62	17.00	17.20		
Eastern States 0-15-30	Manchester					15.00	14.66	30.00	30.96		
Eastern States Fertilizer 0-15-30	Concord					15.00	16.56	30.00	29.01		
Eastern States Fertilizer 0-20-20	Concord					20.00	20.61	20.00	19.71		
Eastern States Granulated Superphosphate 20%	Woodsville					20.00	20.81				
Fox Point Chemical Co. E. Providence, R. I.											
Old Fox Fertilizer 4-12-16	Exeter	4.00	3.91			12.00	12.55	16.00	15.72		
Old Fox Fertilizer 5-8-7-2	Exeter	5.00	5.05			8.00	7.71	7.00	7.28	2.00	4.24
Old Fox 5-10-10-1	Brentwood	5.00	5.57			10.00	9.71	10.00	10.48	1.00	2.74
Old Fox 5-10-10-2	Walpole	5.00	5.04			10.00	10.03	10.00	10.24	2.00	2.40
Old Fox Fertilizer 8-6-2	Exeter	8.00	6.99			6.00	7.40	2.00	2.72		
Old Fox 8-16-16	Brentwood	8.00	8.12			16.00	16.08	16.00	16.01		

Old Fox Fertilizer 8-16-16	Exeter	8.00	7.82			16.00	16.21	16.00	15.60		
Old Fox 0-10-20	Walpole					10.00	9.73	20.00	20.88		
Old Fox 0-12-24	Walpole					12.00	11.90	24.00	24.80		
Old Fox 0-15-30	Brentwood					15.00	14.45	30.00	32.80		
Old Fox 0-20-0	Walpole					20.00	20.43				
Old Fox 0-20-20	Brentwood					20.00	20.24	20.00	24.16		
Old Fox 0-20-20	Brentwood					20.00	20.63	20.00	24.08		
International Minerals & Chem. Corp. Woburn, Mass.											
International Sheep Manure	W. Lebanon	1.25	2.50	1.00	2.10			2.00	2.08		
International Fertilizer 5-8-7-1	Manchester	5.00	4.85			8.00	8.51	7.00	7.76	1.00	1.61
International 5-10-10-1	Concord	5.00	4.86			10.00	10.04	10.00	10.56	1.00	1.31
International 5-10-10-1	Gilford	5.00	5.01			10.00	9.88	10.00	10.72	1.00	1.25
International Fertilizer 5-10-10-1	Benton	5.00	4.84			10.00	9.82	10.00	10.80	1.00	1.56
International Fertilizer 6-12-12-2	Colebrook	6.00	5.77			12.00	13.31	12.00	12.08	2.00	2.43
International 7-7-7-1	Gilford	7.00	6.82			7.00	7.57	7.00	7.60	1.00	1.54
International Fertilizer 8-6-2-1	W. Lebanon	8.00	7.57			6.00	6.53	2.00	2.64	1.00	3.40
International Fertilizer 8-16-16	Manchester	8.00	7.63			16.00	16.79	16.00	16.16		
International 0-10-20	Nashua					10.00	10.29	20.00	21.12		
International Fertilizer 0-10-20	Colebrook					10.00	10.24	20.00	20.16		
International Fertilizer 0-14-14	W. Lebanon					14.00	14.01	14.00	16.64		
International 0-20-20	Concord					20.00	22.40	20.00	20.08		
International 20% Superphosphate	Brentwood					20.00	21.13				
Muriate of Potash 60%	W. Lebanon							60.00	61.12		
Mathieson Chemical Corp. Baltimore, Md.											
Mathieson 20% Superphosphate	Benton					20.00	20.56				
McCormick & Co., Inc. Baltimore, Md.											
Hy-Gro 13-26-13	Rochester	13.00	14.40			26.00	26.65	13.00	15.68		
Merrimack Farmers Exchange, Inc. Concord											
Merrimack 5-10-10	Laconia	5.00	5.15			10.00	10.56	10.00	10.32		
Merrimack 5-10-10	Laconia	5.00	5.14			10.00	10.17	10.00	10.32		
Merrimack Turf Green 8-6-4	Plymouth	8.00	6.78			6.00	8.49	4.00	6.36		

	Sample Drawn In	Nitrogen		Phosphoric Acid				Potash		Magnesium Oxide	
				Total		Available					
		Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found	Guaranteed	Found
Norwood Brand Fertilizer Co. N. Reading, Mass.											
Norwood Brand Sheep Manure	Plymouth	1.50	1.25	0.35	0.29	.....	.....	2.75	3.60	.....	.....
Potash Company of America Carlsbad, New Mexico											
Granular Muriate of Potash 60%	Colebrook	.....	.....	.....	.....	.....	.....	60.00	62.72	.....	.....
Premier Peat Moss Corp. New York, New York											
Premier-Nure 2-1-1	Nashua	2.00	3.13	1.00	2.12	.....	.....	1.00	2.24	.....	.....
Rogers & Hubbard Co. Portland, Conn.											
Gro Fast Cow Manure	Nashua	2.00	2.34	1.00	1.46	.....	.....	1.00	2.48	.....	.....
Hubbard Corn Fertilizer 4-12-4	Keene	4.00	4.42	.....	.....	12.00	11.44	4.00	4.32	.....	.....
Hubbard Vegetable Fertilizer 5-8-7	Keene	5.00	5.40	.....	.....	8.00	8.52	7.00	7.28	.....	.....
Grow Fast Plant Food 5-10-5	Keene	5.00	4.91	.....	.....	10.00	10.21	5.00	5.36	.....	.....
Hubbard General Crop Fertilizer 5-10-10	Keene	5.00	5.02	.....	.....	10.00	10.40	10.00	10.56	.....	.....
Hubbard Weed Kill Lawn Food 6-10-4 with 2, 4-D	Nashua	6.00	5.18	.....	.....	10.00	11.02	4.00	4.01	.....	.....
Hubbard Top Dressing 7-7-7	Nashua	7.00	6.86	.....	.....	7.00	7.88	7.00	7.68	.....	.....
Hubbard Double Strength Fertilizer 8-16-16	Nashua	8.00	8.14	.....	.....	16.00	16.66	16.00	15.32	.....	.....
The Sewerage Commission of Milwaukee Milwaukee, Wisconsin											
Milorganite	Concord	6.00	5.76	2.00	3.46	.....	.....	.....	.....	.....	.....

Stern's Garden Products, Inc. Geneva, New York											
Miracle-Gro 15-30-15	Claremont	15.00	15.02	.....	.....	30.00	31.01	15.00	15.52	.....	.....
Swift & Co. Baltimore, Md.											
Vigoro Complete Plant Food 5-10-5	Nashua	5.00	5.01	.....	.....	10.00	10.03	5.00	5.12	.....	.....
Walker-Gordon Lab. Co. Plainsboro, N. J.											
Bovung Cow Manure Dehydrated	Nashua	2.00	2.01	1.00	1.62	.....	.....	1.00	2.40	.....	.....